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Activities for December
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January, 1933

D. L. VAN DINE HEADS DIVISION

On February 13 D. L. Van Dine became the head of the Bureau's Division of Fruit and Shade Tree Insects, the position made vacant December 31, 1930, by the resignation of A. L. Quaintance. Mr. Van Dine's experience in entomological work is indicated in the following record: He was entomologist of the Hawaii Experiment Station from 1902 to 1909 and organized and developed the work of this station on insects affecting tropical crops and fruits. In the latter year he was transferred to the Bureau of Entomology and organized the work with the sugarcane insects at New Orleans, La. He resigned in 1910 to become entomologist of the experiment station of the Sugar Producers' Association at Rio Piedras, Puerto Rico. From 1913 to 1922 he was again in the Bureau in charge of research work in the biology and control of malarial mosquitoes in the lower Mississippi Valley. During this period he took a furlough for some 19 months (1918-19) to enter the service of the army as captain in the Sanitary Corps, working on insects affecting troops. In 1922 he accepted a position as extension specialist in entomology at Pennsylvania State College, resigning this position in 1924 to join the staff of the Tropical Plant Research Foundation and later to become the director of the Cuba Sugar Club experiment station under the Foundation, at Central Baragua, Cuba. The closing of this station on account of the economic situation in Cuba in 1932 made him available for return to this Bureau.--C. L. M.

COTTON INSECTS

Biology of pink bollworm.--S. L. Calhoun and L. C. Fife, Presidio, Tex., submit the following summary of a study begun August 5, 1932, and completed in December: "Normal long-cycle larvae (of Pectinophora gossypiella Saund.) appeared in open cotton bolls on August 25, at which time 12.34 per cent were of this type. The percentage of long-cycle larvae in open bolls reached a peak of 95.73 per cent on October 4. Immature larval stages were recorded in open bolls on August 5, shortly after the first open bolls appeared in the field. Immature third-instar and fourth-instar larvae, which had been inactive for 60 to 70 days, resumed feeding and completed development when they were supplied with food and moisture and placed in a constant temperature of 80° F."

Effects of flood on pink bollworm.--"The effects of two disastrous floods in the Presidio Valley upon the pink bollworm are discussed," by F. A. Fenton, and W. L. Owen, jr., Presidio, Tex. "It was found that where

open bolls were completely submerged on the plants for 60 hours or more many larvae were killed, but a short submergence killed very few. The larvae in green bolls were more protected and fewer were killed by submergence. Laboratory tests showed that some pink bollworms can survive in submerged green bolls for 9 days, in open bolls either submerged or floating in water for at least 12 days, and in floating green bolls for at least 16 days. * * * the flood had greatly reduced the larval population of the pink bollworm in the Presidio district at the beginning of the 1932-33 winter. The destruction of entire cotton fields by submergence, the killing of many plants in others, together with all parts of the plants in partly submerged fields, served to concentrate the moths on the remaining bolls of the top crop, and resulted in 100 per cent infestation. The pink bollworm modified its habits to survive in the partly flooded cotton fields where many plants were still alive. The flood apparently had no effect upon the migration of moths in partly submerged fields."

Winter feeding of tarnished plant bug.--K. P. Ewing and R. L. McGarr, Tallulah, La., report that "no sweepings were made from December 12 to 24, inclusive, but during the other three weeks of sweepings *Lygus pratensis* L. was found to be active in the fields. Nymphs were collected in the field during the first two weeks, but only adults were found during the last week (December 26-31). It is interesting to note that on an average 14 *L. pratensis* per 100 sweeps were collected on alfalfa during the week of December 26 to 31, showing that this insect was evidently feeding again, after much cold weather."

Sulphur dioxide fumigant deposits sulphur in boll weevil tissues.--"Fumigation tests with sulphur dioxide gas on boll weevils collected from Spanish moss during the latter part of November were continued in December," report F. H. Tucker and J. C. Pearson, Tallulah. "Twenty-three tests were made during the first part of the month, with varied concentrations of sulphur dioxide gas at varied time and temperature. * * * Analyses of the weevils collected from moss and exposed to sulphur dioxide gas, killed and not killed, have been made. Thus far 14 analyses show an abnormal incorporation of sulphur in the bodies of the weevils killed by exposure. Weevils exposed but not killed have shown but little above the normal sulphur content * * * Weevils collected from the moss and not exposed to sulphur dioxide gas were used as checks in the analyses for normal sulphur content."

Collections of boll weevils from Spanish moss--totals for 1925 to 1932.--"The annual fall Spanish moss examinations to determine the number of weevils entering hibernation were begun on November 22 and completed December 12," by R. C. Gaines and assistants, Tallulah. A tabulation of the number of "live weevils per ton of Spanish moss from 1925 to 1932, inclusive, for all localities where records are available" shows that "881 live weevils per ton at Tallulah is the highest number for any year for which records are available, the next highest record being 724 in

1931. In southern Louisiana the record of 510 live weevils per ton in 1932 is less than the number found in 1925, 1928, and 1931, but greater than the number found in 1926, 1927, 1929, and 1930. In South Carolina the 1932 record of 340 live weevils per ton is less than the number found in 1927, 1928, and 1930, but greater than the number found in 1925, 1926, 1929, and 1931. In Georgia the 1932 record of 845 live weevils per ton is the highest number for any year for which records are available. In Alabama the record of 147 weevils per ton in 1932 is less than the number found in 1927, 1929, and 1930, but greater than the number found in 1928 and 1931."

INSECTS AFFECTING MAN AND ANIMALS

Ectoparasites of deer in Pennsylvania.--Harold S. Peters, Takoma Park, Md., spent December 5 to 7 studying the ectoparasites of deer in south central Pennsylvania, a continuation of a cooperative study made in the deer-hunting seasons of 1930 and 1931. An examination of 19 deer yielded 34 Tricholipeurus virginianus Peters, 4 Cervophthirius crassicornis (Nitzsch), and 28 Dermacentor nigrolineatus Packard. Mr. Peters says, "It is interesting to note that only one species of biting louse was found, as in other parts of the State two species have been found. No especially heavy infestation was observed. But this information does show us that there is a sufficient infestation of external parasites to cause severe damage should conditions become favorable for a sudden increase. The past three years' survey shows that the lice and ticks are found on deer throughout the main deer sections of Pennsylvania." T. virginianus has been collected in 13 counties. "This species of biting louse makes up about 90 per cent of the biting lice on Pennsylvania deer and was undescribed until 1930." T. parallelus (Osborn), another biting louse, has been found in 7 counties. "This is the so-called 'common deer louse' but really makes up only about 10 per cent of the biting lice on Pennsylvania deer." G. crassicornis, a sucking louse, generally rather rare on eastern deer, was found in 7 counties. The tick D. nigrolineatus was found in 9 counties of the State.

Goat lice yield to sulphur dips.--O. G. Babcock, Sonora, Tex., reports that "On October 7, 1932, the entire flock of Experiment Station goats, some 570 animals, were dipped twice in the latest and best formula. This formula consists of 10 pounds thylox sulphur dust, 25 ounces linseed oil soap, 25 ounces sodium phosphate tribasic, and 100 gallons of water. The temperature of the dip for the two dippings was 78° and 88° F., respectively. All animals were held in the dip for a minimum of one-half minute and each animal was ducked at least four times. This insured a thorough wetting of the animal. Examinations to date cover a period of 75 days since dipping and have not revealed a single lousy goat in the flock. On October 13, in a single experiment, animals were dipped in 2 pounds of wettable 300-mesh sulphur, plus the linseed oil soap and the sodium phosphate tribasic. Not a live louse has been found to date."

Oviposition of a tropical house mosquito.--Reporting further on oviposition of Culex quinquefasciatus Say, mentioned in the December Monthly Letter, G. H. Bradley, Orlando, Fla., says that of 556 egg boats deposited, 198, or 36.6 per cent, were laid on water containing rotted soy beans; 184, or 33.1 per cent, on water containing soy sauce; 101, or 18.2 per cent, on water containing hay infusion; 40, or 7.2 per cent, on water containing manure; and 33, or 5.9 per cent, on clear water. "The manure water, which has been particularly efficient in collecting eggs, apparently lost its attractiveness to the ovipositing females during the month (December), as it showed fewer egg rafts than any of the other tubs, except the check."

Blowfly parasite survey--summary.--D. C. Parman, Uvalde, Tex., reports that "From the jars exposed in Salinas Valley, Calif., in September, the new Alysia sp. has continued to emerge to the end of the month (December) in considerable numbers. This parasite is indicated to be active at lower temperatures than any of the others we are working with, and possibilities of its usefulness in a complex at Uvalde are enhanced. * * * During the last half of the year (1932) 1,008 jars were exposed over approximately 2,000 miles of route in Texas, Kansas, Oklahoma, California, Illinois, and Oregon. Of these 945 were returned and produced 17,877 specimens of beetles, 12,098 parasites, and 65,400 flies to the end of the year. One new larval parasite has been found, the distribution of Brachymeria fonscolombei Duf. in good numbers has been extended over an area of more than 1,000 miles of route in four States, and the distribution of Psilodora and Xyalosema spp. has been extended considerably."

Botfly larvae in horses, tongues decrease with advance of winter.--To determine "how late in the winter, in the northern latitudes, horses may continue ingestion of botfly (Gastrophilus intestinalis) larvae issuing from the eggs carried by the host after the last of the fly activity," E. F. Knipling, Ames, Iowa, made a count of all larvae found in 20 tongues purchased from a disposal plant. The following counts in tongues examined on different dates show the waning infestation: On December 1, 52 larvae in 5 tongues; on December 9, 31 larvae in 3 tongues; on December 10, 114 larvae in 2 tongues; on December 13, 63 larvae in 3 tongues; on December 17, 23 larvae in 5 tongues; and on December 31, 7 larvae in 2 tongues. The stomachs and duodena of 8 of these horses were examined and following are the findings: 938 Gastrophilus nasalis L. in the duodena; 603 G. intestinalis DeG. in the stomachs; 1 G. haemorrhoidalis L. in a stomach."

STORED PRODUCT INSECTS

Store-room pests and their parasites active in the field.--Reporting on moth-trapping experiments with malt-sirup baits to aid in determining what percentage of the infestation by dried-fruit insects can be traced directly to the field, Perez Simmons, Fresno, Calif., lists the "signif-

icant species taken in 9 bait pails in 2 vineyards and in 1 fig orchard
 * * * The tabulations were made by H. C. Donohoe:

Species	Sept. 30 to Oct. 25	Oct. 28 to Nov. 22
Lepidoptera:		
<u>Ephestia</u> <u>figulilella</u> Greg.	2,284	131
<u>Ephestia</u> <u>elutella</u> Hbn.	18	10
<u>Ephestia</u> <u>kuehniella</u> Zell.	8	1
<u>Ephestiodes</u> <u>nigrella</u> Hulst	57	7
<u>Plodia</u> <u>interpunctella</u> Hbn.	52	3
<u>Pyralis</u> <u>farinalis</u> L.	112	5
Hymenoptera:		
(Parasites)		
<u>Microbracon</u> <u>hebetor</u> Say	126	116
<u>Nemeritis</u> <u>canescens</u> Grav.	117	53
<u>Mesostenus</u> <u>gracilis</u> Cress.	1	0
<u>Ephialtes</u> <u>exareolata</u> Ashm.	0	4
<u>Anomalon</u> sp.	10	12 "

Burning pea fields aids in weevil control.--To determine what advantage the burning of pea fields has over the practice of turning under pea stubble and straw for humus, A. O. Larson, Corvallis, Oreg., compared the increase in weevil infestation in 1932 with that in 1931 in six burned and eight unburned fields. He found that "the rate of infestation averaged 12.40 times as much in 1932 in unburned fields as in 1931 in the same fields, and less than 3 times (2.68) as much in fields that had been burned. The increase in burned fields could be traced directly to the spread of weevils from unburned fields."

Life history of cigarette-beetle parasite.--A. W. Morrill, jr., Richmond, Va., obtained records in December "of the parasite Aplastomorpha calandrae How. on the larvae of Lasioderma serricorne Fab. The incubation period was usually less than 1 day and is combined with the larval period in the following summary: Incubation and larval period, 8.1 days; prepupal period, 1.2 days; pupal period, 8.5 days; egg-to-adult period, 17.8 days."

Cold weather halts activity of tobacco pests.--W. D. Reed, Richmond, Va., reports that "No activity of the cigarette beetle and the tobacco moth (Ephestia elutella Hbn.) was noted in unheated warehouses in December. On December 9 and 10 visits were made to several warehouses in eastern North Carolina. No active adult insects were observed and all larvae were inactive. The weather in the bright tobacco belt was very cold in December. A heavy snow fell in this section on December 16 and 17 and the thermometer registered a low of 15° F. in Richmond in the month."

TOXICOLOGY AND PHYSIOLOGY OF INSECTS

Tarsi of flies carry gustatory sense.--N. E. McIndoo, Takoma Park, Md., noting that D. E. Minnich, of the University of Minnesota, has shown that the tarsi of butterflies and blowflies are extremely sensitive to sugar solutions, in one instance being 256 times as sensitive as are the human taste organs, says: "I repeated some of Minnich's experiments (with flies) and found that in order to bring about the proboscis response by using water or sugar water, the tarsus must actually be touched. When either water or sugar water on a small pencil brush was brought as close as 3 mm to the tarsus, no response was produced, but if thirsty the fly responded at once when the tarsus was touched with either water or sugar water. If not thirsty, but hungry, the fly responded only to sugar water. When the two brushes, one wet with water and the other with sugar water, were tied together and held side by side 3 mm from the tarsus of a hungry, but not thirsty, fly, no response was produced; and none was seen when the water brush touched the tarsus, leaving the sugar water at a distance of 3 mm; but when the sugar-water brush touched the tarsus a response was very evident. Therefore, in order to have a response the initial stimulus must be a mechanical one, which must then be followed by a chemical one in the form of odorous vapors from water or sugar water."

BEE CULTURE

Large colonies favorable to honey production.--C. A. Farrar and A. P. Sturtevant, Laramie, Wyo., reporting on the relation of production to population in colonies ranging in size from 15,000 to 45,000 bees, submit data to show that the stronger colonies have decided advantages over small colonies. They state that "one colony having 30,000 bees produced 151.2 pounds, while two colonies having 15,000 each produced 100 pounds together; or one colony with 45,000 bees produced 172.5 pounds, while 3 colonies having 15,000 bees each produced 100 pounds together."

Young bees constitute most of winter cluster.--In an experiment to determine the distribution of bees of various ages in the winter cluster, Mr. Farrar and Myrtle M. Cluster first killed a colony of bees with hydrocyanic acid gas generated from one ounce of potassium cyanide, the charge being sufficiently heavy" to kill all the bees, even in the center of the cluster, before they could break or loosen, * * * a total of 23,978 bees being recorded, 4,016 of which were marked with 18 different colors and ranged in age from 71 to 105 days. * * * Bees of all ages were found in all parts of the cluster and there was apparently no distribution according to age. * * * There was a very marked tendency for 2 or more bees of the same age to be next to each other or separated only by 1 or 2 bees, * * * These results, supported by the daily death rate of marked bees in all colonies now under observation, suggest that practically all of the bees in the winter cluster are physiologically

young as far as their ability to winter is concerned, and that a few days to 3 to 4 weeks is not of measurable importance when the bees have a possible life of 6 to 8 months."

FRUIT AND SHADE TREE INSECTS

Effect of snow on California red scale.--H. R. Yust, Whittier, Calif., reports a unique opportunity for observation of Chrysomphalus aurantii Mask. afforded by an unusual snowfall which occurred in certain lemon groves near the Whittier laboratory. A light snowfall occurred near Corona on December 12. On December 20 mortality counts were made of the scales on 16 lemons. Mr. Yust states: "The scales located on the top surface of the lemons where the snow settled showed a definitely lower survival in both resistant and nonresistant stages than those located on the under surface. The stages resistant to cyanide also seem to be more able to resist the cold weather than are the nonresistant stages. The survival of the resistant stages averaged 28.5 per cent, whereas of the nonresistant stages, 10.4 per cent survived exposure to the snow." (This has a very interesting bearing on the theory that "resistance" to cyanide gas is acquired!--C. L. M.)

Finer sulphurs more effective in control of citrus thrips.--In connection with various studies of sulphur dust at the Lindsay, Calif., laboratory, E. A. McGregor makes the following report on the relation between fineness of division and insecticidal effectiveness. A sulphur company was induced to prepare three different "grinds" of sulphur, one of 200-mesh, one of 325-mesh and one of 400-mesh. Each of these sulphur grades was replicated twice in a 16-acre orange orchard, and estimates of damage by citrus thrips (Scirtothrips citri Moulton) were made in each plat at harvest time. A very pronounced correlation between sulphur fineness and thrips control is indicated by data from this experiment, as follows: The area treated with 400-mesh sulphur showed 4.3 per cent damaged fruit; that treated with 325-mesh sulphur, 9.8 per cent; that with 200-mesh sulphur, 15.1 per cent; and the untreated area, 48.1 per cent.

Trichogramma may breed through winter in Georgia.--In a further effort to learn more about winter hosts of Trichogramma minutum Riley, Herbert Spencer, in charge of pecan insect parasite work, reports that 10 bait traps have been run in a large commercial planting 4 miles south of Albany, Ga. "In all, 4,625 moths were caught in the jars during the month. At least a dozen species of cutworms were taken, numerous individuals of 4 species of cutworm moths laid their eggs when placed in cotton-plugged shell vials and these eggs hatched normally, indicating that oviposition by these species during the winter is not unusual. The results of the bait-trap work confirm last year's results and give more weight to our theory that Trichogramma goes through our winter in the pecan groves by breeding in eggs of moths normally present there."

Rain protector for moth bait traps.--In connection with the traps referred to above, Mr. Spencer says: "A noteworthy and interesting feature of these bait jars is a device suggested by Luther Brown, to protect the contents from rain, which ordinarily necessitates refilling and is a source of trouble and inconvenience in such work. Pieces of flat sheet metal 5 inches square were bent diagonally and were wired 3 inches above the mouth of each jar, in roof fashion. In December there were a number of showers, totalling about 3 inches of rainfall, but because of these roofs over the jars, the fermenting solution did not have to be changed, and kept in such good condition that moths were attracted even after the solution had been used 30 days. We recommend such protection to all workers who have bait-pan tests to make."

Effects of placement in trap banding for the codling moth.--M. A. Yothers, in charge of the Wenatchee, Wash., field laboratory, reports as follows on experiments conducted in cooperation with E. H. Siegler, Takoma Park, Md.: "Comparison of automatic 4-inch bands half way around apple-tree trunks with 2-inch bands on the opposite side, showed, first, that the 4-inch half-bands averaged 74 (codling moth) larvae per tree, as compared with 78 larvae for the 2-inch half-bands--showing no advantage for the two 2-inch bands on account of the extra labor required to apply them; second, that both 4-inch and 2-inch half-bands averaged a few more larvae on the east side of the tree trunks than on the west side--76 to 72, and 82 to 75 larvae, respectively; third, that both 4-inch and 2-inch half bands showed considerably higher average catches per tree when placed well up toward the branching scaffold limbs than when placed nearer the ground--87.7 to 60.6, and 87.8 to 70.2 larvae, respectively; fourth, where two 2-inch half-bands were placed on the same side of the trunks with a 2-inch space between them, the lower band averaged 89.73 larvae per tree, as compared with 70.2 larvae for the top band."

Codling-moth eggs more susceptible to oil sprays as they become older.--R. F. Sazama, in charge of the Vincennes, Ind., laboratory, submits a detailed report on experiments conducted with ovicides against the eggs of the codling moth. All eggs were sprayed with one-half of 1 per cent oil emulsion. The weather was cool and, as a result, only the most advanced eggs reached the red-ring stage by the fourth day. The experiment proves "that a newly laid egg is more resistant to oil sprays than an older egg, at least up to the red-ring stage of development." A tabulation of the results follows:

Age of eggs when sprayed	Percentage of hatch	
	Experiment 27	Experiment 28
1 day	41.2	29.5
2 days	23.8	24.4
3 "	20.1	22.1
4 "	18.5	14.4
Unsprayed eggs	94.3	86.9

Field results in codling moth control.--E. J. Newcomer, in charge of the Yakima, Wash., laboratory, has summarized his season's field work as follows: "Very good control of the codling moth was obtained with lead arsenate and mineral oil emulsion, but this combination is difficult to remove from the fruit. Fish oil does not control so well, but the residue is more easily removed. No difficulty in removing the arsenical residues is experienced if late sprays are of some nonarsenical with either fish oil or mineral oil. Very good results have been obtained with cryolite and postassium fluoaluminate used in this way (with adhesives), and fair results with nicotine or pyrethrum. Bands for codling moth control do not need so heavy a chemical treatment for use in the Pacific Northwest as in the East. There was no apparent advantage in a flanged band or in the other commercial bands tried. The 2-inch band was as effective as the 4-inch band. The use of some alpha naphthylamine with the beta naphthol seemed to make the bands somewhat repellent, but both these and the plain beta-naphthol bands caught more worms than did the untreated bands."

TRUCK CROP AND GARDEN INSECTS

Correction.--In the November, 1932, Monthly Letter, page 9, lines 38-39, Heteroderes laurentii Guer. should be Cylas formicarius Fab.

Low-temperature limit for gladiolus thrips.--R. H. Nelson, of the entomology greenhouse, Washington, D. C., reports that "Counts were made for mortality of Taeniothrips gladioli M. & S. from the first lots of corms kept at low temperatures. These lots had been in storage one month. There were 30 corms in each lot and they were held at temperatures of 30°, 40°, and 50° F., respectively." At 30° F., the mortality of larvae, pupae, and adults was 100 per cent; at 40° F., 81.13 per cent; at 50° F., 26.2 per cent. "After examination the corms were fumigated with cyanide to kill any living thrips that might have been missed and were then left in the greenhouse at approximately 70° F. for two weeks to check for hatching of eggs. None hatched in the 30° and 40° lots, but there was hatching and consequent reinestation in the 50° lot."

T. gladioli was observed to be breeding on amaryllis, a new host-plant record. All stages were found to be present. Streaking and crimping of the petal edges were much like those in gladiolus. Some feeding on the foliage and main stem also occurred."

Narcissus bulb fly more abundant near woods.--C. H. Martin, Sumner, Wash., reports that "Data now accumulated show rather definitely that proximity of narcissus bulbs to woods causes higher percentage of infestation by Merodon equestris Fab. * * * Samples were dug from two sections of a field where the bulbs have been in the ground for from three to five years. In the section immediately adjacent to a second-growth fir woods, the percentage of infested bulbs in four varieties, Princeps, Poeticus recurvus, Telamonius plenus, and Golden Phoenix were 18.7 per

cent, 32.2 per cent, 21.2 per cent, and 73.4 per cent, respectively. In a section located from 200 to 300 yards away from the woods, the percentages of infestation for the same varieties were 3.9 per cent, 13.3 per cent, 11.0 per cent, and 9.0 per cent, respectively."

Most infested narcissus bulbs contain only one larva of bulb fly.--C. F. Doucette, Sumner, reports on a four-year study (1928 to 1931) of the larval population of M. equestris in narcissus bulbs. In 9,976 bulbs recorded, 93.38 per cent were infested with 1 larva; 5.73 per cent with 2 larvae; 0.80 per cent with 3 larvae; 0.07 per cent with 4 larvae; and 0.01 per cent with 5 larvae.

Poison bait sprays for lesser bulb flies.--F. S. Blanton, Babylon, N. Y., has submitted a seasonal report on poison bait sprays for the control of Eumerus tuberculatus Rond., Eumerus strigatus Fall., and other bulb insects. "It was found that in the stronger dosages sodium fluoride (4 ounces to 4 gallons of water) and sodium arsenite (4 ounces to 4 gallons of water) cause considerable burn to the narcissus foliage. A subsequent decrease in yield, below normal, may be expected. The cherry fruit fly bait spray (lead arsenate with sugar, black-strap sirup, and water) is not quite so toxic to the bulb fly when used fresh but when exposed to the weather becomes more potent with age. No injurious effects on foliage or yield were noted. After 42 days of exposure in the field, during which 4.76 inches of rain were recorded, the six sprays discussed in the report were still present on the foliage and were found strong enough to give 100 per cent mortality within 2 days."

Fall migration of beet leafhopper.--Summarizing a study of the fall shift of Eutettix tenellus Bak. out of the summer breeding grounds, W. C. Cook, Davis, Calif., says, "the fall migration into the winter breeding grounds apparently does not move farther than 15 or 20 miles, unless there are enormous populations in summer breeding grounds. This reduces the problem of weed control to an area of not over 15,000 or 16,000 acres."

Breeding of dipterous parasite of bean beetle.--B. J. Landis and R. W. Brubaker, Columbus, Ohio, report that "Breeding of the parasite Paradexodes epilachnae Ald., and host, the Mexican bean beetle, continued through December in the laboratory. The life cycle of the parasite was lengthened by maintaining the puparial stage at a temperature of 52° to 54° F. There appears to be some selectivity of the more hardy individuals held within this temperature range. After several generations of the fly bred under these conditions, the temperature at which the puparia will be held will be lowered in an attempt to breed a hardier strain of flies." Mr. Brubaker noted that in a constant-temperature cabinet run within a known relative humidity range, the addition, a day before the fly would normally emerge, of a slight quantity of water to the blotting paper lining the bottoms of the Petri dishes containing puparia accelerates emergence. "Previously it was found that fly puparia lost weight rather gradually from the time of pupation to within one or two days prior to emergence. However, weighings made on these last two days prior to

emergence showed increases in weight. It is also noted that in closed containers in which puparia are held the moistened blotting paper dries out rapidly as the flies emerge. This tendency on the part of nearly developed puparia to absorb water may facilitate the emergence operation, as the bursting of the puparium is dependent on the localization of body fluids in the ptilinum."

Effect of low temperature on cane-berry mites.--Reporting on the Eriophyes of cane berries, particularly Eriophyes essigi Hassan, Joseph Wilcox, Puyallup, Wash., states: "From December 6 to 15, temperature dropped below freezing each day, on the 10th and 11th was down to about 10° F., and on the 14th when loganberry leaves were examined Eriophyes were still present on the leaf surface, showing that these mites do not always reach the buds for hibernation before winter weather arrives. In none of the buds examined * * * was there any evidence of injury to the mites from the low temperatures. Dead mites, or rather the empty skins, were abundant in some buds infested with predacious mites, probably Seius pomi Parrott; two other species of mites were commonly observed in the buds and often closely associated with the Eriophyes, but no evidence was obtained that they were predacious. Eriophyid eggs were found in buds of the undetermined variety of blackberry collected on December 29 in Seattle, but in no other buds. A thornless variety of blackberry growing in close proximity to the other did not have a single mite; all the buds on the thornless variety were dead, apparently from the low temperature, and it is possible the mites had deserted it after the injury; and no evidence of damage was noted in the buds of the other blackberry."

FOREST INSECTS

Parasite work at Melrose Highlands, Mass.--summary.--J. A. Millar has completed the examination of 369,100 eggs from 766 gipsy moth egg clusters collected last fall in 37 towns in New England. He found that 51,672 eggs, or 14.0 per cent, were parasitized by Anastatus disparis Ruschke and 4,856 eggs, or 1.3 per cent, by Ocencyrtus kuvanae How.

Mr. Millar and R. Wooldridge have completed summarizing the results of the 1932 study of the parasitization of gipsy moth larvae, this work being based on two sample collections in each of 37 towns in the infested New England area--a total of 7,838 larvae. The percentages of larvae killed by various species of parasites are as follows: By Apanteles melanoscelus Ratz., 0.6 per cent; by Compsilura concinnata Meig., 13.4 per cent; by Hyposotor disparis Vier., 0.1 per cent; by Sturmia scutellata R. D., 0.4 per cent; by unknown tachinids, 0.1 per cent; total larval parasitization, 14.6 per cent.

T. H. Jones has compiled the results obtained in 1932 from dissections (by H. A. Bess and H. C. Hyson) of large brown-tail moth larvae for parasite records. A total of 1,254 larvae were collected in 16 towns in New England. The parasitization was as follows: By Compsilura concinnata, 11.2 per cent; by Sturmia nidicola Towns., 7.7 per cent; by Meteorus versicolor Wesm., 3.1 per cent; by unknown parasites, 0.6 per cent; total, 22.0 per cent.

Mr. Millar also reports that in 1932 he dissected 1,668 large satin moth larvae collected in New England. Of these 78, or 4.6 per cent, were parasitized by C. concinnata, and there was only a trace of parasitization by Apanteles sp.

Mr. Jones reports that 1,231 pupae of the satin moth were collected in 1932 from 23 New England towns and were observed by Mr. Millar. The following parasites have issued from this material: 89 C. concinnata, 4 Tachina mellea Wlk. 4 Phorocera claripennis Macq., 3 Zenillia blanda Osten Sacken, 1 Carcelia laxifrons Vill., 1 Sturmia scutellata, 2 undetermined tachinids, 8 Ephialtes conquisitor Say, and a number of Psychophagus omnivorus Wlk. Psychophagus issued from only one collection and 9 of the 75 pupae were parasitized by it.

J. V. Schaffner, jr., assisted by C. L. Griswold, has tabulated the data on hibernating hosts of C. concinnata and the summer hosts for 1932. He reports: "From the 1931 collections of native larvae, C. concinnata was reared from 35 different host species, 6 of which acted as hibernating hosts; 9 of the host species are new records for our host list of this parasite; and 2 were new hibernation records. The rearings for 1932 to date also show 35 different host species, 4 of which are new host records. Since this work was begun in 1915, C. concinnata has been reared from 130 native identified host species and from a few other species not yet identified."

Jack Frost most effective control of pine beetles.--An event of rare occurrence is reported by J. M. Miller, Berkeley, Calif. On the Badger Springs project of the Modoc National Forest cooperative control work against the western pine beetle, planned to cover 44,000 acres at a cost of \$22,000, was started early in December, K. A. Salman and E. F. Wohlentz directing the camp of 70 workers. On December 9 to 11 a cold snap of unusual severity occurred, the temperatures for three consecutive nights falling below -15° F., and during the day being above zero for a few hours only. Samples of bark from the infested trees sent in to the Berkeley laboratory on December 27 revealed a mortality of the western pine beetle as high as 100 per cent. Dr. Salman and assistants then made a thorough check of conditions in the area. Preliminary examinations in the field indicated a kill approaching 80 per cent of the overwintering beetle population, results exceeding any that might be hoped for from artificial control. Plans were, therefore, made at once for closing down the control work. The extent of the killing, as determined by laboratory study of 140 samples, apparently varies according to brood stages and thickness and tightness of bark. Killing of all stages of the western pine beetle is found, however, and there is also high mortality among the predators, flathead borers, and mountain pine beetle broods. Mr. Miller says that the only other authentic instance of appreciable mortality occurred near Bend, Oreg., in 1922, following a cold spell quite similar to that just recorded in northeastern California.

of the western pine beetle ranging from 6 per cent to 92 per cent in the Ochoco and Deschutes National Forests in eastern Oregon, following low winter temperatures. They state that of the factors affecting mortality bark thickness has the greatest effect. Bark 1 inch or less in thickness usually showed a brood mortality of 80 per cent or more. Bark from 1 1/2 to 2 inches thick showed mortality ranging from 6 per cent to over 60 per cent. The average mortality of the western pine beetle in all the bark sampled was about 50 per cent. However, "the bark examinations showed that there had been some brood mortality before the freeze. * * * Many dead temnochilids were also found in the bark, although small dipterous parasites were often found living in bark where pine beetle brood had died of cold. Mr. Buckhorn also found many dead cerambycids and some dead brood of the red turpentine beetle (Dendroctonus valens Lec.) in the field." Recommendations for curtailment of control work in this area will await further examination of samples, but it is believed that this unexpected aid from Jack Frost will serve to reduce the burden of control cost.

Airplane collections of insects in New England.--In October, 1932, W. L. Baker submitted for determination insect material collected in an airplane insect trap in May, 1932. These species have been identified by Bureau specialists. Two male gipsy moths were taken at an altitude of 1,000 feet and 1 between 300 and 500 feet. Other insects taken at the highest altitudes were: 1 Aphidius nigripes Ashm. at 700 to 1,500 feet; 1 Hoplogryon at 1,000 feet; and 2 Harmolita at 1,000 feet and 1 at 2,000 feet.

Control of Douglas fir beetle in Cody Canyon.--E. E. Miller, Coeur d'Alene, Idaho, reports the completion of the second season's work in bark-beetle control in Cody Canyon. This project was instituted in the fall of 1931 and was directed against an epidemic of the Douglas fir beetle in a stand of Douglas fir already weakened by spruce budworm defoliation. In 1931, 12,038 infested trees were treated and a reduction of 53 per cent of the infested trees was reported. The work in 1932 brings out the fact that the reduction in beetle population from the work in 1931 was actually much greater than 53 per cent, as the trees treated were very heavily infested, the attacks reaching well up into the boles. In 1932, new areas containing 2,500 trees were added to the project, bringing the number of trees treated in the past season to 8,158. The trees were treated at a total labor cost of \$0.763 per tree. The results of the 1932 operation will be reported after a survey to be made in August, 1933.

CEREAL AND FORAGE INSECTS

Lethal effect of low temperature on pea aphid.--L. P. Rockwood, Forest Grove, Oreg., reports as follows on observations on Illinoia pisi Kalt. on vetch and Austrian winter field peas: "The fall was wet and mild until December 7. On that date, the wind shifted to the east and it be-

came very dry and cold. The minimum temperature went down to 5° or 6° F. on four mornings and freezing weather prevailed throughout the period December 7 to 15. * * * Of 120 aphids picked up from the ground under peas on December 9 and 12, 78 1/3 per cent were killed. The percentages of survival for the different stages were: For nymphs and more than half-grown larvae, 29 per cent and 32 per cent, respectively; for adults, 7.7 per cent; for larvae less than half grown, 13.6 per cent. The aphids on these crops are all of the agamic form. In addition to the actual killing of the aphids by the cold, the vetch was so badly damaged by the cold that the surviving aphids will have difficulty in finding nourishment. The Austrian peas stood the cold better than did the vetch."

Parasitization of wheat joint worm.--W. J. Phillips, Charlottesville, Va., reports: "Dissections of our galls of Harmolita tritici Fitch collected regularly at permanent observation points in the Middle Atlantic and mid-Western States have been completed * * *. A study of these data, in contrast with the 1931 results, reveals no significant changes in the total percentage (ranging in 1932 from 47.88 at Greenville, Tenn., to 64.76 at Warrenton, Va.) of parasitization at any of the observation points. However, there was considerable variation in the mortality during 1931 and 1932. The year 1931 was characterized by normal rainfall and a wet summer season, conditions that favor the activity of fungus diseases attacking the joint worm. The dry season of 1930 gave conclusive evidence that joint worm mortality from causes other than entomophagous parasitization reaches its minimum during dry years. In contrast with the 1930 and 1931 seasons, the mortality in 1932 (ranging from 6.05 per cent at Sparta, Ill., to 38.75 per cent at Greenville, Tenn.) seems moderate."

Unfavorable weather prevents expected outbreak of Hessian fly.--"Severe fall infestations of the Hessian fly were in prospect over Kansas, Missouri, and Nebraska, as shown by the June survey," reports J. R. Horton, Wichita, Kans. "The expected fall outbreak was prevented, principally by weather, which first interfered with seed-bed preparation, then retarded germination and growth. In some sections also sowing was purposely delayed in observance of planting-date recommendations. Most of the wheat plantings over the entire region were poorly developed with few tillers, almost no stooling, and obviously little or no fly infestation as they entered the winter in November. Widely scattered fields sown very early after good but often local showers and scant volunteer wheat occurred in all sections. * * * These were in general freely infested and contained much fly."